



Biology

© 2009

STANDARDS		PAGE REFERENCES
S11.A The Nature of Science		
S11.A.1 Reasoning and Analysis		
S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems. Reference: 3.1.10.A, 3.2.10.A, 3.1.10.E		
S11.A.1.1.1 Compare and contrast scientific theories, scientific laws, and beliefs (e.g., the law of gravity, how light travels, formation of moons, stages of ecological succession).	Student Edition: 11-13, 62-64, 182-183, 336-338, 340-341, 394-395, 402-407, 420, 422 <i>In the Field</i> 408 <i>National Geographic</i> 421 <i>Section Assessment</i> 15 (#2) Teacher Wraparound Edition: DC 403; WS 12	
S11.A.1.1.2 Analyze and explain how to verify the accuracy of scientific facts, principles, theories, and laws.	Student Edition: 11-14, 16, 18-20 <i>BioDiscoveries</i> 350, 842, 924 <i>In the Field</i> 408 <i>MiniLab</i> 184 <i>National Geographic</i> 17 Teacher Wraparound Edition: CB 12; DC 183; WS 12	

STANDARDS	PAGE REFERENCES
<p>S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).</p>	<p>Student Edition: 11, 16 <i>BioLab: Design Your Own</i> 173, 533, 593, 925, 1039 Teacher Wraparound Edition: CT 18; DC 11; MI 11</p>
<p>S11.A.1.1.4 Explain how specific scientific knowledge or technological design concepts solve practical problems (e.g., momentum, Newton’s laws of universal gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, atomic theory, theory of relativity, Pasteur’s germ theory, relativity, heliocentric theory, gas laws, processing and feedback systems).</p>	<p>Student Edition: 5-6, 11-14, 182-185, 1060-1061, 1076-1077 <i>Biology & Society</i> 258 <i>Cutting-Edge Biology</i> 208, 532, 982 Teacher Wraparound Edition: CB 184; SP 1077</p>
<p>S11.A.1.1.5 Analyze or compare the use of both direct and indirect observation as means to study the world and the universe (e.g., behavior of atoms, functions of cells, birth of stars).</p>	<p>Student Edition: 16, 18-19, 183-185, 392-393, 401-407 <i>BioDiscoveries</i> 350 Teacher Wraparound Edition: MI 392</p>
<p>S11.A.1.2 Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications. Reference: 3.2.10.A, 4.3.10.B</p>	
<p>S11.A.1.2.1 Explain and apply scientific concepts to societal issues using case studies (e.g., sea level change, spread of HIV, deforestation, environmental health, energy).</p>	<p>Student Edition: <i>Biology & Society</i> 50, 258, 680, 1010, 1066, 1096 <i>Cutting-Edge Biology</i> 208, 532 <i>In the Field</i> 82, 136 <i>MiniLab</i> 77 Teacher Wraparound Edition: AG 680; DIB 50; WIB 208, 258, 1010</p>
<p>S11.A.1.2.2 Use case studies (e.g., Wright brothers’ flying machine, Tacoma Narrows Bridge, Henry Petroski’s Design Paradigms) to propose possible solutions and analyze economic and environmental implications of solutions for real-world problems.</p>	<p>Student Edition: <i>Biology & Society</i> 50, 592, 680, 870, 1010 <i>In the Field</i> 82, 136 <i>MiniLab</i> 77 Teacher Wraparound Edition: DIB 50; WIB 208, 258, 1010; WS 133</p>

STANDARDS	PAGE REFERENCES
<p>S11.A.1.3 Describe and interpret patterns of change in natural and human-made systems. <i>Reference: 3.1.10.C, 3.1.10.E, 4.8.10.A</i></p>	
<p>S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).</p>	<p>Student Edition: <i>BioLab</i> 843 <i>BioLab: Design Your Own</i> 173 <i>MiniLab</i> 66, 101, 996 <i>National Geographic</i> 67 Teacher Wraparound Edition: DC 67</p>
<p>S11.A.1.3.2 Describe or interpret dynamic changes to stable systems (e.g., chemical reactions, human body, food webs, tectonics, homeostasis).</p>	<p>Student Edition: 10, 62-64, 66, 938, 1032-1035, 1080-1081 <i>MiniLab</i> 42, 1035 <i>National Geographic</i> 67 Teacher Wraparound Edition: RE 1037; RS 10</p>
<p>S11.A.1.3.3 Describe how changes in physical and biological indicators (e.g., soil, plants, or animals) of water systems reflect changes in these systems (e.g., changes in bloodworm populations reflect changes in pollution levels in streams).</p>	<p>Student Edition: 126-127 <i>BioDiscoveries</i> 842 Teacher Wraparound Edition: AG 842; DE 126</p>
<p>S11.A.1.3.4 Compare the rate of use of natural resources and their impact on sustainability.</p>	<p>Student Edition: 105, 123-127, 129-130 <i>Biology & Society</i> 50 <i>In the Field</i> 82 Teacher Wraparound Edition: DC 130</p>
<p>S11.A.2 Processes, Procedures and Tools of Scientific Investigations</p>	
<p>S11.A.2.1 Apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process. <i>Reference: 3.2.10.B, 3.2.10.B</i></p>	
<p>S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.</p>	<p>Student Edition: <i>BioLab: Design Your Own</i> 23, 51, 83, 173, 235, 533, 567, 593, 653 <i>MiniLab</i> 19 Teacher Wraparound Edition: CT 18</p>

STANDARDS	PAGE REFERENCES
<p>S11.A.2.1.2 Critique the elements of the design process (e.g., identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.</p>	<p>Student Edition: <i>BioLab: Design Your Own</i> 871 <i>Cutting-Edge Biology</i> 982 Teacher Wraparound Edition: WIB 982</p>
<p>S11.A.2.1.3 Use data to make inferences and predictions, or to draw conclusions, demonstrating understanding of experimental limits.</p>	<p>Student Edition: <i>BioLab: Design Your Own</i> 83, 173, 533, 593, 1035 <i>Data Analysis Lab</i> 14, 39, 714 <i>MiniLab</i> 19, 101, 912</p>
<p>S11.A.2.1.4 Critique the results and conclusions of scientific inquiry for consistency and logic.</p>	<p>Student Edition: <i>BioDiscoveries</i> 842, 924 <i>BioLab: Design Your Own</i> 23, 173, 287, 533, 593 <i>Data Analysis Lab</i> 14 <i>MiniLab</i> 19 Teacher Wraparound Edition: CT 18</p>
<p>S11.A.2.1.5 Communicate results of investigations using multiple representations.</p>	<p>Student Edition: <i>BioLab: Design Your Own</i> 23, 51, 287, 533, 593 <i>BioLab: Internet</i> 783, 899, 1067 <i>Skillbuilder Handbook</i> 1115-1118</p>
<p>S11.A.2.2 Evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide. Reference: 3.7.10.B, 3.8.10.B</p>	
<p>S11.A.2.2.1 Evaluate appropriate methods, instruments, and scale for precise quantitative and qualitative observations (e.g., to compare properties of materials, water quality).</p>	<p>Student Edition: xxxv-xliii, 19, 183-185 <i>BioLab: Design Your Own</i> 173, 567, 593, 925, 1035 <i>MiniLab</i> 19, 48 Teacher Wraparound Edition: CT 18; DC 184</p>
<p>S11.A.2.2.2 Explain how technology is used to extend human abilities and precision (e.g., GPS, spectroscope, scanning electron microscope, pH meters, probes, interfaces, imaging technologies, telescope).</p>	<p>Student Edition: xxxv-xliii, 19, 183-185, 364-370, 372-376 <i>Cutting-Edge Biology</i> 106, 208, 504, 982 <i>MiniLab</i> 365 <i>National Geographic</i> 377 <i>Section Assessment</i> 186 (#1) Teacher Wraparound Edition: CB 184</p>

STANDARDS	PAGE REFERENCES
S11.A.3 Systems, Models and Patterns	
S11.A.3.1 Analyze the parts of a simple system, their roles, and their relationships to the system as a whole. <i>Reference: 3.1.10.A, 3.1.10.E, 4.3.10.C</i>	
S11.A.3.1.1 Apply systems analysis, showing relationships (e.g., flowcharts, decision trees, dichotomous keys, mind map), input and output, and measurements to explain a system and its parts.	Student Edition: <i>BioLab: Field Investigation</i> 623 <i>Launch Lab</i> 991 <i>MiniLab</i> 42, 396, 488, 519, 1035 <i>Section Assessment</i> 44 (#5, #6) Teacher Wraparound Edition: DC 45; FA 1009; FOLD 47; SP 37, 971
S11.A.3.1.2 Analyze and predict the effect of making a change in one part of a system on the system as a whole.	Student Edition: 1032-1035, 1037 <i>Data Analysis Lab</i> 1007 <i>Launch Lab</i> 991 <i>MiniLab</i> 42, 996, 1002, 1035 <i>Section Assessment</i> 44 (#4) Teacher Wraparound Edition: CT 47; DE 48, 126
S11.A.3.1.3 Use appropriate quantitative data to describe or interpret a system (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).	Student Edition: <i>BioLab</i> 137 <i>BioLab: Design Your Own</i> 51, 287 <i>Data Analysis Lab</i> 131, 164 <i>MiniLab</i> 66, 127
S11.A.3.1.4 Apply the universal systems model of inputs, processes, outputs, and feedback to a working system (e.g., heating systems, motor, food production) and identify the resources necessary for operation of the system.	This standard can be met when incorporating the following pages: Student Edition: 10, 938, 1032-1035 <i>BioLab</i> 843, 925 <i>MiniLab</i> 220, 996, 1002, 1035 Teacher Wraparound Edition: DC 1032; RS 10; SP 1032

STANDARDS	PAGE REFERENCES
<p>S11.A.3.2 Compare observations of the real world to observations of a constructed model. <i>Reference: 3.1.10.B, 3.2.10.B, 4.1.10.B, 4.6.10.A</i></p>	
<p>S11.A.3.2.1 Compare the accuracy of predictions represented in a model to actual observations and behavior.</p>	<p>Student Edition: xxxv, 20 <i>BioDiscoveries</i> 350 <i>BioLab</i> 83, 209, 443, 843 <i>MiniLab</i> 203, 334, 1035, 1082 Teacher Wraparound Edition: DE 330</p>
<p>S11.A.3.2.2 Describe advantages and disadvantages of using models to simulate processes and outcomes.</p>	<p>This standard can be met when incorporating the following pages: Student Edition: <i>BioDiscoveries</i> 350 <i>BioLab</i> 83, 209, 443, 843 <i>MiniLab</i> 203, 334, 1035, 1082 Teacher Wraparound Edition: DE 330</p>
<p>S11.A.3.2.3 Describe how relationships represented in models are used to explain scientific or technological concepts (e.g., dimensions of the solar system, life spans, size of atomic particles, topographic maps).</p>	<p>Student Edition: 97-99, 244-245, 396 <i>BioLab</i> 443, 843 <i>MiniLab</i> 245 <i>National Geographic</i> 396 Teacher Wraparound Edition: DE 330, 396</p>
<p>S11.A.3.3 Compare and analyze repeated processes or recurring elements in patterns. <i>Reference: 3.1.10.C, 3.2.10.B</i></p>	
<p>S11.A.3.3.1 Describe or interpret recurring patterns that form the basis of biological classification, chemical periodicity, geological order, or astronomical order.</p>	<p>Student Edition: 149, 394-396, 487-488, 499-503 <i>BioLab</i> 505 <i>MiniLab</i> 396, 500 <i>National Geographic</i> 397 Teacher Wraparound Edition: CB 152; DE 488; SP 397</p>
<p>S11.A.3.3.2 Compare stationary physical patterns (e.g., crystals, layers of rocks, skeletal systems, tree rings, atomic structure) to the object's properties.</p>	<p>Student Edition: 148-155, 393-396, 642, 941-942, 946 Teacher Wraparound Edition: CB 152; DC 642; SP 148; WS 942</p>

STANDARDS		PAGE REFERENCES	
S11.A.3.3.3	Analyze physical patterns of motion to make predictions or draw conclusions (e.g., solar system, tectonic plates, weather systems, atomic motion, waves).	Student Edition: 66, 974 <i>BioDiscoveries</i> 924 <i>MiniLab</i> 66 <i>National Geographic</i> 67 Teacher Wraparound Edition: AG 924; WIB 924	
S11.B	Biological Sciences		
S11.B.1	Structure and Function of Organisms		
S11.B.1.1	Explain structure and function at multiple levels of organization. <i>Reference: 3.3.10.A, 3.3.10.B, 4.6.10.A, 4.7.10.B</i>		
S11.B.1.1.1	Explain how structure determines function at multiple levels of organization (e.g., chemical, cellular, anatomical, ecological).	Student Edition: 8, 187-190, 193-198, 221, 329-331, 336-337, 428-430, 637-638, 644-647, 992-996 Teacher Wraparound Edition: CT 221; DC 329; RS 647; SP 993	
S11.B.1.1.2	Compare and contrast the structural and functional similarities and differences among living things (e.g., classify organisms into existing classification groups, compare systems).	Student Edition: 486-488, 490-496, 498, 499-503 <i>BioLab</i> 623, 681, 717 <i>Data Analysis Lab</i> 494 <i>Launch Lab</i> 483 <i>MiniLab</i> 488, 500 <i>National Geographic</i> 497 Teacher Wraparound Edition: CB 499; CT 487	
S11.B.1.1.3	Compare and contrast cellular processes (e.g., photosynthesis and respiration, meiosis and mitosis, protein synthesis and DNA replication).	Student Edition: 220, 222-224, 226-227, 228-233, 248, 250-251, 270-272, 274-276, 333-335, 336-338, 340-341 <i>MiniLab</i> 220 <i>Section Assessment</i> 276 (#6) Teacher Wraparound Edition: FA 233; SP 275	

STANDARDS		PAGE REFERENCES
S11.B.2 Continuity of Life		
S11.B.2.1 Explain the mechanisms of the theory of evolution. <i>Reference: 3.3.10.C, 3.3.10.D, 3.4.10.D, 4.7.10.C</i>		
S11.B.2.1.1 Explain the theory of evolution by interpreting data from fossil records, similarities in anatomy and physiology, embryological studies, or DNA studies that are relevant to the theory of evolution.	Student Edition: 418-420, 422, 423-428 <i>BioDiscoveries</i> 442 <i>Launch Lab</i> 391 <i>National Geographic</i> 421 <i>Section Assessment</i> 430 Teacher Wraparound Edition: DE 424; SP 423	
S11.B.2.1.2 Explain the role of mutations, differential reproduction, and gene recombination in changing the genetic makeup of a population.	Student Edition: 275-276, 283, 345-349, 431-437 <i>BioLab</i> 443 <i>Section Assessment</i> 276 (#5) Teacher Wraparound Edition: DC 434; RS 283	
S11.B.2.1.3 Explain the role of selective breeding and biotechnology in changing the genetic makeup of a population.	Student Edition: 360-361, 363, 370-371, 419 <i>Data Analysis Lab</i> 420 <i>In the Field</i> 286 <i>Launch Lab</i> 359 <i>MiniLab</i> 361 Teacher Wraparound Edition: AG 286; DC 370	
S11.B.2.1.4 Explain why natural selection can act only on inherited traits.	Student Edition: 420, 434-435 <i>National Geographic</i> 421 Teacher Wraparound Edition: DC 421	
S11.B.2.2 Describe how genetic information is inherited and expressed. <i>Reference: 3.3.10.C</i>		
S11.B.2.2.1 Describe how genetic information is expressed (i.e., DNA, genes, chromosomes, transcription, translation, and replication).	Student Edition: 270, 278, 329-332, 333-335, 336-338, 340-341 <i>MiniLab</i> 331, 334 <i>National Geographic</i> 339 Teacher Wraparound Edition: AC 329; DC 332, 335	

STANDARDS	PAGE REFERENCES
<p>S11.B.2.2.2 Compare and contrast the functions of mitosis and meiosis in passing on genetic information.</p>	<p>Student Edition: 246-247, 248, 250-252, 270-272, 274-276 <i>National Geographic</i> 249, 273 <i>Section Assessment</i> 276 (#6) Teacher Wraparound Edition: SP 275</p>
<p>S11.B.2.2.3 Explain how different patterns of inheritance affect population variability (i.e., multiple alleles, co-dominance, dominance, recessiveness, sex-influenced traits, and sex-linked traits).</p>	<p>Student Edition: 279-280, 296-298, 302-309, 431-436 Teacher Wraparound Edition: CB 432, 436; DC 432; SP 297</p>
<p>S11.B.3 Ecological Behavior and Systems</p>	
<p>S11.B.3.1 Use evidence or examples to explain the characteristics of and interactions within an ecosystem. <i>Reference: 4.3.10.C, 4.6.10.A</i></p>	
<p>S11.B.3.1.1 Explain the significance of diversity in ecosystems.</p>	<p>Student Edition: 116-121 <i>In the Field</i> 82, 136 <i>Section Assessment</i> 121 (#1-#7) Teacher Wraparound Edition: DI 136; SP 118</p>
<p>S11.B.3.1.2 Explain the biotic (i.e., plant, animal, and microbial communities) and abiotic (i.e., soil, air, temperature, and water) components of an ecosystem and their interaction.</p>	<p>Student Edition: 35, 38-40, 60-61, 66, 94-96 <i>BioLab</i> 107 <i>Data Analysis Lab</i> 39, 98 <i>Section Assessment</i> 40 (#1) Teacher Wraparound Edition: DC 35</p>
<p>S11.B.3.1.3 Describe how living organisms affect the survival of one another.</p>	<p>Student Edition: 35, 38-40, 41-42, 95-96 <i>BioLab</i> 107 <i>Data Analysis Lab</i> 98 Teacher Wraparound Edition: WS 96</p>
<p>S11.B.3.1.4 Compare the similarities and differences in the major biomes (e.g., desert, tropical rain forest, temperate forest, coniferous forest, tundra) and the communities that inhabit them.</p>	<p>Student Edition: 66, 68-73 <i>Section Assessment</i> 73 (#1, #4, #5) Teacher Wraparound Edition: CB 68; DC 70, 71; SP 68</p>

STANDARDS	PAGE REFERENCES
<p>S11.B.3.1.5 Predict how limiting factors (e.g., physical, biological, chemical factors) can affect organisms.</p>	<p>Student Edition: 94-96 <i>BioLab</i> 107 <i>Data Analysis Lab</i> 98 <i>Section Assessment</i> 99 (#2) Teacher Wraparound Edition: WS 95, 96</p>
<p>S11.B.3.2 Analyze patterns of change in natural or human-made systems over time. <i>Reference: 3.1.10.C, 4.2.10.D, 4.3.10.B, 3.1.10.E, 4.3.10.C</i></p>	
<p>S11.B.3.2.1 Use evidence to explain how cyclical patterns in population dynamics affect natural systems.</p>	<p>Student Edition: 62-64, 95-96, 100-105 <i>Data Analysis Lab</i> 63 Teacher Wraparound Edition: DC 62; SP 102; WS 96</p>
<p>S11.B.3.2.2 Explain biological diversity as an indicator of a healthy environment.</p>	<p>Student Edition: 117-118, 120-121 <i>BioLab</i> 137 <i>In the Field</i> 136 <i>Section Assessment</i> 121 (#1)</p>
<p>S11.B.3.2.3 Explain how natural processes (e.g., seasonal change, catastrophic events, habitat alterations) impact the environment over time.</p>	<p>Student Edition: 62-64, 67, 94-95, 122-123, 399 <i>National Geographic</i> 67 Teacher Wraparound Edition: WS 122</p>
<p>S11.B.3 Ecological Behavior and Systems</p>	
<p>S11.B.3.3 Explain how human-made systems impact the management and distribution of natural resources. <i>Reference: 4.2.10.C, 4.4.10.C, 3.8.10.C</i></p>	
<p>S11.B.3.3.1 Describe different human-made systems and how they use renewable and nonrenewable natural resources (i.e., energy, transportation, distribution, management, and processing).</p>	<p>Student Edition: 123-127, 129-130 <i>Biology & Society</i> 50, 680 <i>Section Assessment</i> 135 (#2) Teacher Wraparound Edition: DC 130</p>

STANDARDS	PAGE REFERENCES
<p>S11.B.3.3.2 Compare and contrast the impact of management practices (e.g., production, processing, research, development, marketing, distribution, consumption, by-products) in meeting the need for commodities locally and globally.</p>	<p>Student Edition: 129-131, 133-135, 370-371 <i>Biology & Society</i> 50, 680 <i>MiniLab</i> 77 <i>Section Assessment</i> 135 (#5)</p> <p>Teacher Wraparound Edition: DC 133; SP 129; WS 133</p>
<p>S11.B.3.3.3 Explain the environmental benefits and risks associated with human-made systems (e.g., integrated pest management, genetically engineered organisms, organic food production).</p>	<p>Student Edition: 123-128, 129-131, 134-135, 370-371 <i>Biology & Society</i> 680</p> <p>Teacher Wraparound Edition: AG 680; RS 370</p>